

STUDIES ON THE *STELLARIA LONGIPES* COMPLEX
(CARYOPHYLLACEAE)—TAXONOMY

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ABSTRACT

Based on previously published biosystematic data, we conclude that variation in the *Stellaria longipes* group is due to a complex interaction of phenotypic plasticity and genetic variability. Only a single species (*S. longipes*) is recognized, with two intraspecific taxa, *Stellaria longipes* subsp. *longipes* and *S. longipes* subsp. *arenicola*, comb. nov.

Key Words: *Stellaria longipes*, taxonomy, Caryophyllaceae, Canada, northern hemisphere

Stellaria longipes was described by Goldie in 1822 from material which he had collected three years earlier “in the woods near Lake Ontario” (Goldie, 1822), probably along the shores of the Bay of Quinte. In Goldie’s diary (Goldie, 1967) for 14 June 1819, when he travelled from Kingston as far as the Bay of Quinte, he noted that “Today I have met with a number of interesting plants, some of which are new to me . . .” No specimen of *Stellaria longipes* collected by Goldie has been located either by ourselves or by previous workers. There can be no doubt, however, as to the plant referred to by Goldie, for it still grows in the area through which Goldie travelled and no other component of the *Stellaria longipes* complex occurs in that part of North America. Material from the type locality and elsewhere was used in our experimental studies of this complex (Chinnappa, 1985a, 1985b; Chinnappa and Morton, 1974, 1976, 1984; Cai and Chinnappa, 1989a, 1989b; Gifford and Chinnappa, 1986; Macdonald and Chinnappa, 1988, 1989; Macdonald et al., 1984, 1986, 1987, 1988). Since Goldie described this species in 1822, many new names have been created for components of the complex in other parts of its broad range of distribution.

The taxonomic problems of the group were recognized at an early stage by Hooker (1829–1834) who, in discussing some of the taxa, commented, “I scarcely know whether they should constitute species or rather be described as varieties.” The same problem has confronted subsequent writers of regional floras, who have chosen either to combine all or most of the entities within

Stellaria longipes, or to recognize several species. The first attempt at a world-wide revision of the complex was that of Hultén (1943), who recognized six species: *S. longipes*, *S. ciliatosepala* Trautv., *S. laxmanni* Fischer ex Ser., *S. crassipes* Hultén, *S. laeta* Richardson and *S. monantha* Hultén. Hultén's work was based on a study of herbarium material and distribution, together with field observations. In a revision of his views, Hultén (1968) used the name *S. edwardsii* R. Br. for *S. ciliatosepala* and considered *S. laxmanni* to be a similar plant "of obscure status." *Stellaria stricta* Richardson, previously treated as a synonym of *S. ciliatosepala*, was included in *S. longipes*. Porsild (1963) in a similar revision (but with much more material at his disposal) recognized nine species in this complex: *S. longipes*, *S. crassipes*, *S. arenicola* Raup, *S. stricta*, *S. subvestita* E. Greene, *S. monantha*, *S. laeta*, *S. edwardsii* and an unnamed species "*S. laxmanni*, sensu Hultén." At the other extreme Polunin (1940, 1959) recognized only a single species, *S. longipes*, throughout the arctic range of this complex, commenting that "it grows in a wide variety of situations . . . being among the most familiar and ubiquitous of arctic inhabitants."

The first attempt at a biosystematic approach to the problems of variation in this complex was that of Böcher (1951), who worked primarily with material from Greenland and Scandinavia and recognized the six species of Hultén (1943). From a consideration of ecology, geographical distribution, and the limited cytological data available, Böcher tentatively concluded that, ". . . the species of the *longipes* group are not sharply separated but the variation is not continuous either. The species perhaps represent particularly well-balanced gene complexes with a specific ecology." More recently Philipp (1972), working with Böcher on material from northwestern Greenland, concluded that there is no correlation between chromosome number and morphology (or taxonomy) and that in certain instances the plants do not fit into the six species recognized by Böcher and Hultén. Porsild (1963) concluded from his taxonomic study of this complex that it was necessary to ". . . leave the final decision to the future when the taxonomy and genetics . . . have been studied more fully and, preferably, on material grown under controlled conditions of light and temperature." The present study developed from discussions with Dr. Porsild by one of us (JKM) in 1968. His intimate knowledge of this complex, both in the field and the herbarium, and

his insight into the problems that it presents were invaluable to us during our work on the complex.

TAXONOMIC IMPLICATIONS

Though the *Stellaria longipes* complex is exceptionally variable, this variation cannot be satisfactorily treated by orthodox taxonomic methods. Those characters that are under genic control are scattered more or less at random throughout the range of distribution of the species (Chinnappa and Morton, 1976) and there is little or no correlation between them, with polyploidy (Chinnappa and Morton, 1974), or with the environment. All populations investigated are interfertile, and most show a high degree of phenotypic plasticity, being also affected by environmental conditions (Chinnappa and Morton, 1984). Accordingly, we are of the opinion that no useful purpose is served by giving taxonomic recognition to this variation. We believe that *S. longipes* should be treated as a single polymorphic species without infraspecific taxa. The only exception to this conclusion, which we recognize, is the morphologically and biologically distinct series of populations on the Lake Athabasca sand dunes on the borders of Saskatchewan and Alberta (Macdonald et al., 1987). These populations appear to have evolved *in situ* into distinctive genotypes, adapted to the specialized environmental conditions provided by the extensive series of dunes occurring on the south side of Lake Athabasca. These genotypes were named *Stellaria arenicola* by Raup (1936). Their evolution has been accompanied and facilitated by a possible shift in the breeding system in favor of self pollination. This entity is interfertile with other populations of *S. longipes* and intergrades with them in its natural habitat; hence, we consider that it does not justify recognition at a level above that of subspecies. Accordingly, we propose the following taxonomy and synonymy for the *Stellaria longipes* complex.

Stellaria longipes Goldie subsp. **longipes** Edinburgh Philos. J. 6: 327. 1822. TYPE: none designated and none known to exist; type locality “in woods near Lake Ontario”—in the Bay of Quinte area. NEOTYPE here designated *Morton* NA5101 (E—duplicates in CAN, K, UAC, WAT and JKM) from near Odessa, Kingston, Ontario, Canada; on natural prairie on limestone. 13 June 1972. Material from this same collection, which was

grown in cultivation at Waterloo, is also lodged in E, K, UAC and JKM.

Alsine strictiflora Rydb., Bull. Torrey Bot. Club 39: 315. 1912.

Stellaria arctica Schischkin, Fl. U.S.S.R. 6: 418, 881. 1936.

S. ciliatosepala Trautv. in Middend. Reise Sibir. 2: 52, Tab. 8, Fig. 1. 1856.

S. crassipes Hultén, Bot. Not. 1943: 261, Fig. 1h–n and map (Fig. 3).

S. edwardsii R. Br. in Franklin Narr. journey Polar Sea, App. VII: 738. 1823.

S. laeta Richardson in Franklin, *l.c.* 1823.

S. laxmanni Fischer ex Ser. in DC. Prodr. 1: 397. 1824.

S. longipes var. *altocaulis* (Hultén) C. Hitchc., Vasc. Pl. Pacific Northwest 2: 307. 1964.

S. monantha Hultén, Bot. Not. 1943: 265 Fig. 7a–f and map (Fig. 9). inc. var. *altocaulis* Hultén and subsp. *atlantica* Hultén.

S. nitida Hook. in Scoresby Journal of a voyage to the Northern Whale-fishery. Edinburgh Philos. J. VIII: 411. 1823.

S. palustris Richardson in Franklin *l.c.* 1823.

S. peduncularis Bunge in Ledeb. Fl. Altaic. 2: 157. 1830.

S. stricta Richardson in Hook. Fl. bor.-amer. 1: 96. 1830.

S. subvestita E. Greene, Ottawa Naturalist, 15: 42. 1901.

***Stellaria longipes* Goldie subsp. *arenicola* (Raup) Chinnappa & J.K. Morton *comb. nov.* TYPE: Saskatchewan: on sand dunes south of William Pt., south shore of Lake Athabasca, August 16, 1935, *Raup 6882* (HOLOTYPE: GH-!; ISOTYPE: CAN-!).**

S. arenicola Raup, J. Arnold Arbor. 17: 248, pl. 196. 1936.

S. longipes var. *arenicola* (Raup) B. Boivin, Naturaliste Canad. 93: 646. 1966.

(Note: Herbarium acronyms are as given in Holmgren et al., 1981, save that JKM represents the research herbarium of one of the authors.)

Goldie's type collection of *Stellaria longipes* is missing. He donated his specimens to the herbarium of the University of Glasgow which was subsequently transferred to that of the Royal Botanical Gardens, Edinburgh, where many of Goldie's collections are to be found. However, his collection of *S. longipes* has been sought by many workers including Porsild, Hultén and one of the present authors (JKM), but without success. Accordingly we hereby designate a neotype for *S. longipes* subsp. *longipes*. The collection that we have chosen is a recent one made by ourselves a few miles from the locality where Goldie is believed to have collected in 1819. It has been chosen because we are satisfied that it belongs to the same genotype as the original collection, and because we used this material in our experimental

work on this species complex. Also we have adequate duplicate material for distribution to other herbaria.

For typification of the many synonyms of *Stellaria longipes* subsp. *longipes*, the reader is referred to Hultén (1943) and Porsild (1963).

Despite the major lumping of taxa that we have proposed, *Stellaria longipes* is, on occasions, difficult to distinguish from certain members of the genus because of the great range of variation that it displays. The main difficulties arise in separating *S. longifolia* ($2n = 26$) and *S. longipes* ($2n = 52$ to 104). The following characters have, however, been found to provide reliable separation. In *S. longifolia* the leaves are always very narrow and are broadest above the middle; their margins and the stems are minutely tuberculate-scabrous. In *S. longipes* the leaves can be narrowly to broadly lanceolate-triangular but are always broadest at the base, and their margins and the stem are not scabrous (though they may be ciliate).

We have not had the opportunity to study material of *Stellaria alaskana* Hultén, *S. ruscifolia* Pallas ex Schlange, *S. florida* Fischer, or *S. fischeriana* DC.; hence we have excluded them from the above taxonomy and synonymy. The first two species appear to us to be distinct but related to *S. longipes*, while the last two appear to be part of the *S. longipes* species complex.

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